The Strategy Unit.

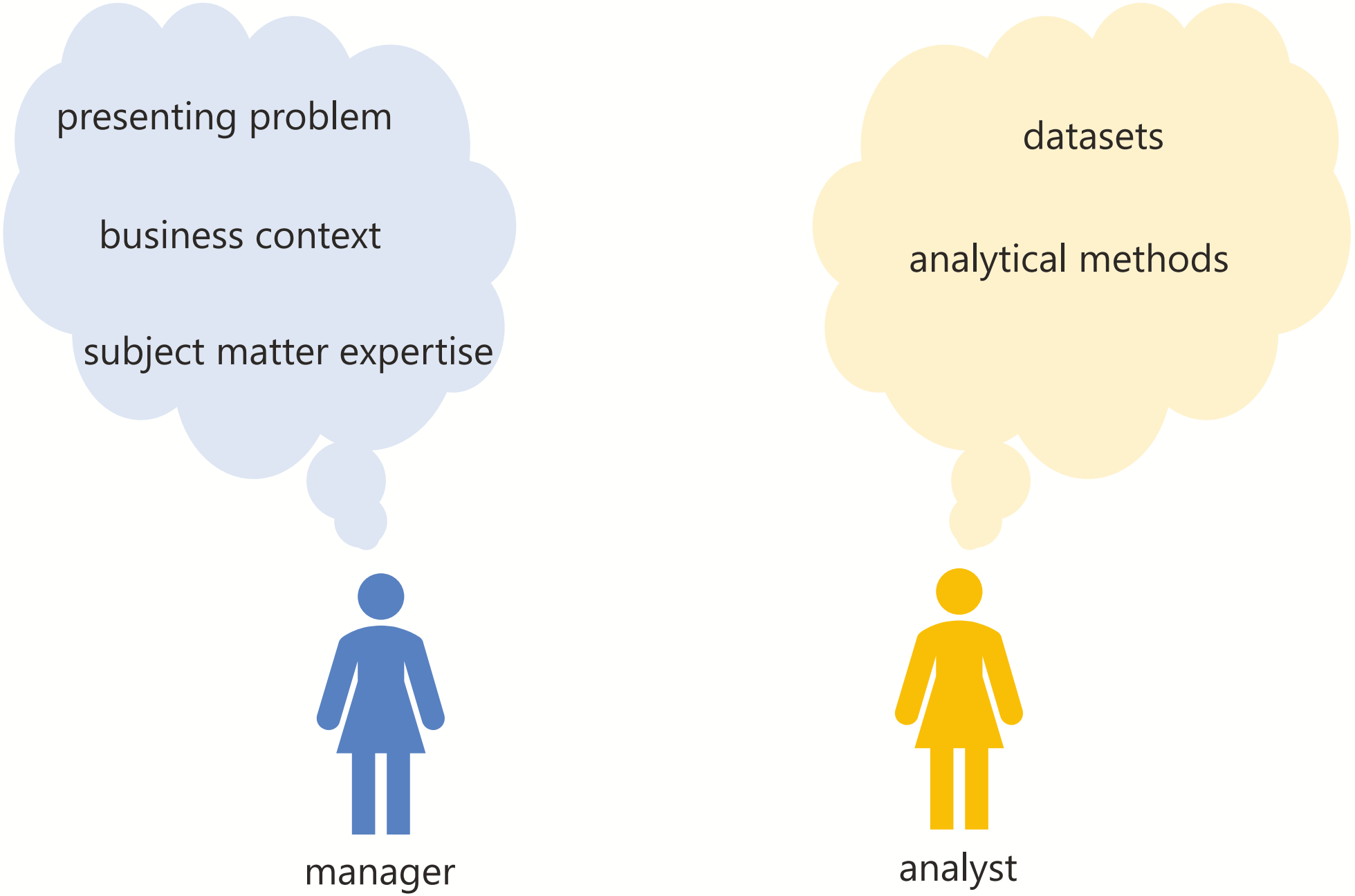
An introduction to problem structuring

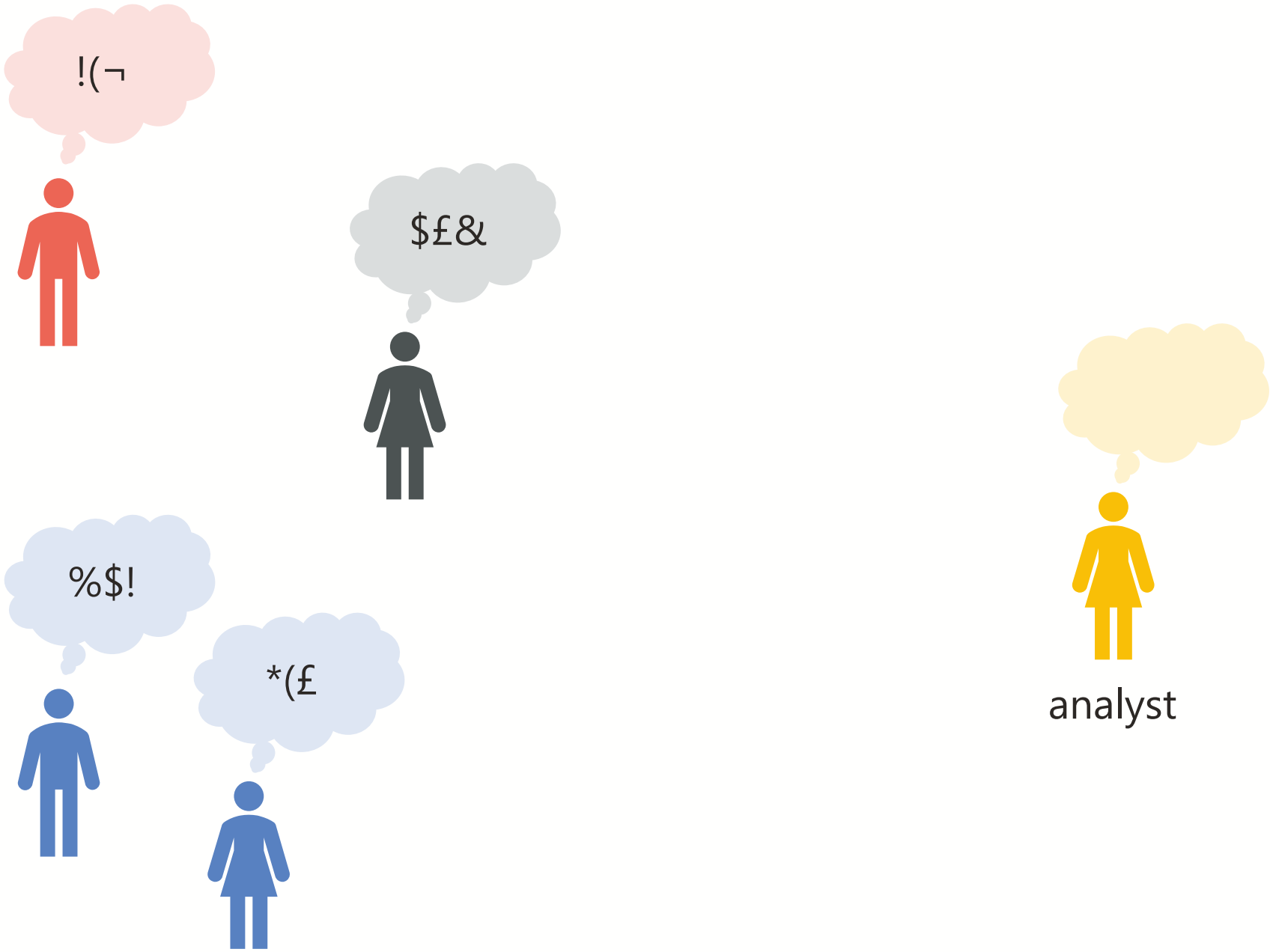
Midlands Analysts Huddle

15 May 2025

NHS
Midlands and Lancashire
Commissioning Support Unit

A problem of information asymmetry

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stakeholders
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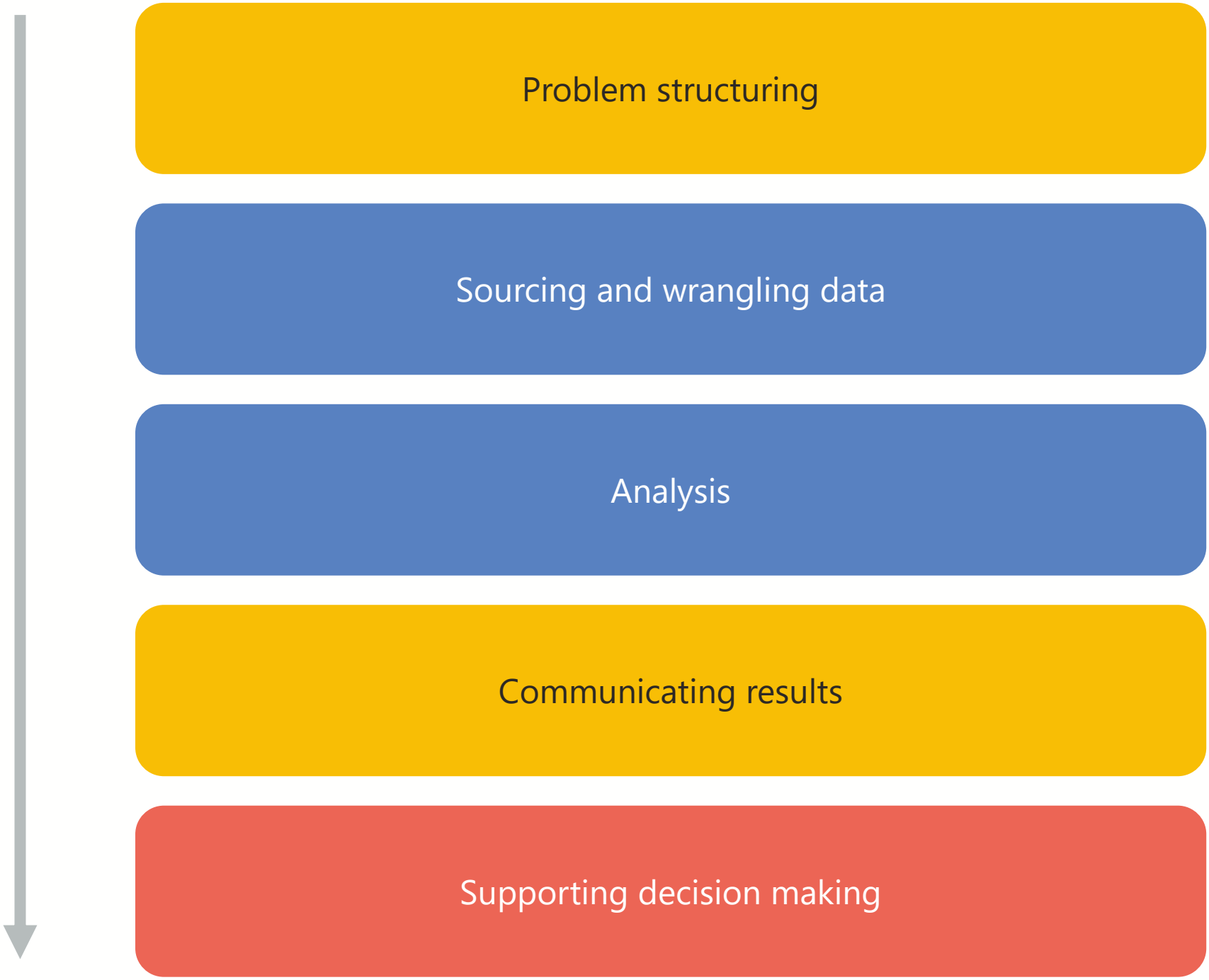
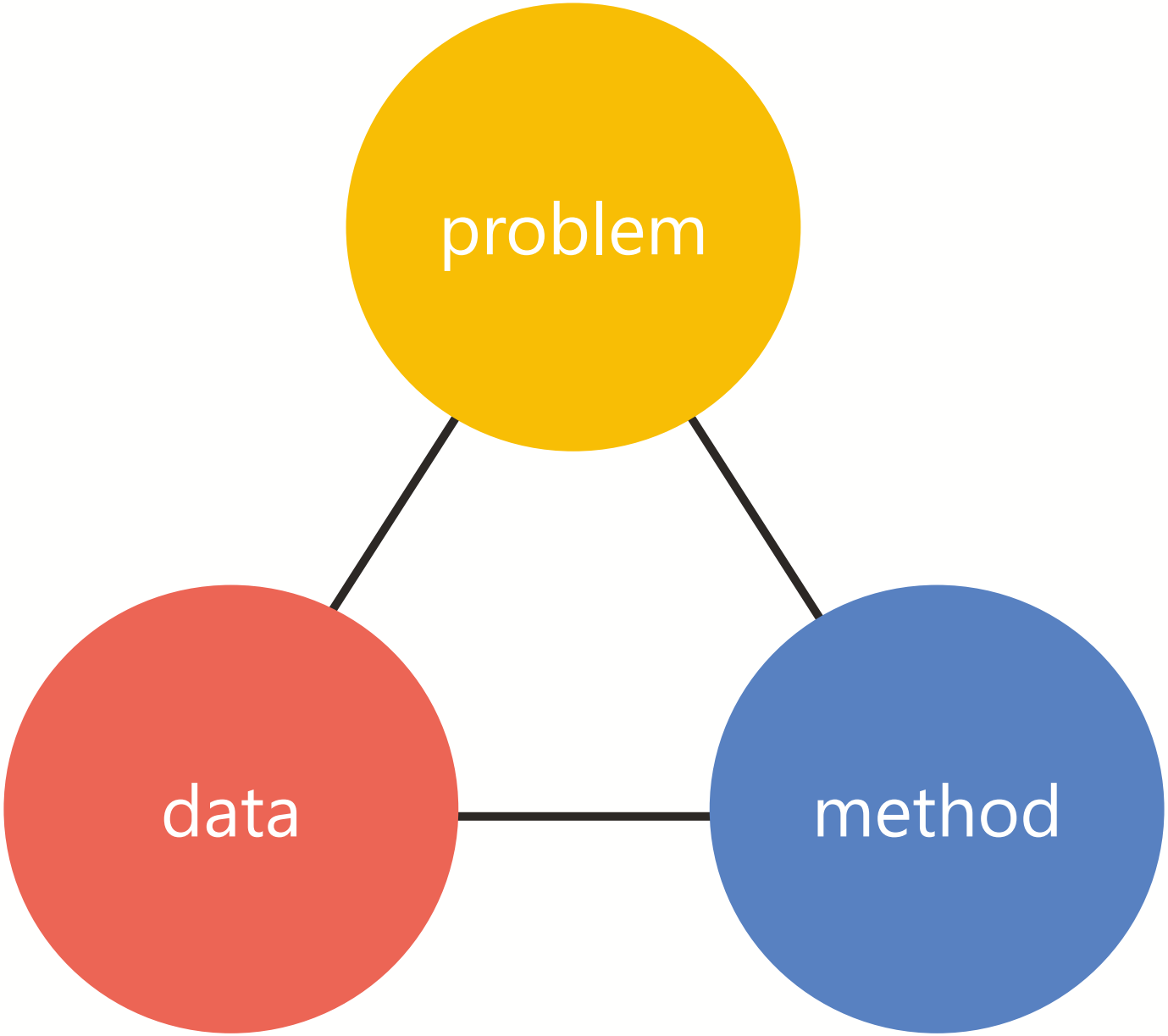

Problem structuring
Sourcing and wrangling data
Analysis
Communicating results
Supporting decision making

Problem structuring
a working definition for today

The process by which an analyst, working with her/his colleagues or customers, establishes and confirms the nature, context and complexities of a problem, such that s/he can specify with increased confidence a set of analyses that will appropriately address the problem.


problem
data
method

Informal, intuitive methods → Semi-formal approaches & frameworks → Formal methods

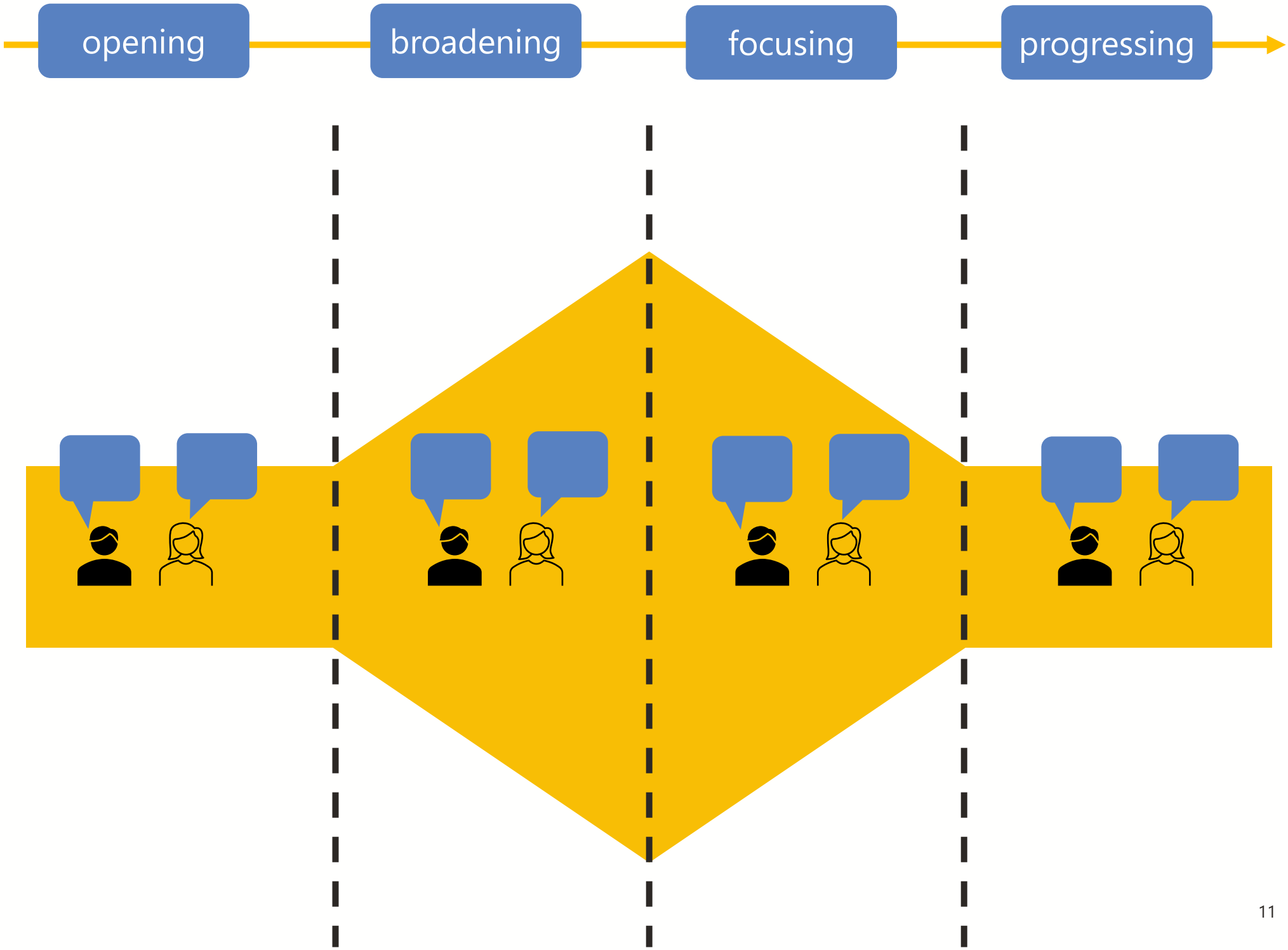
Conversations between managers /clinicians and analysts

Problems, puzzles and messes

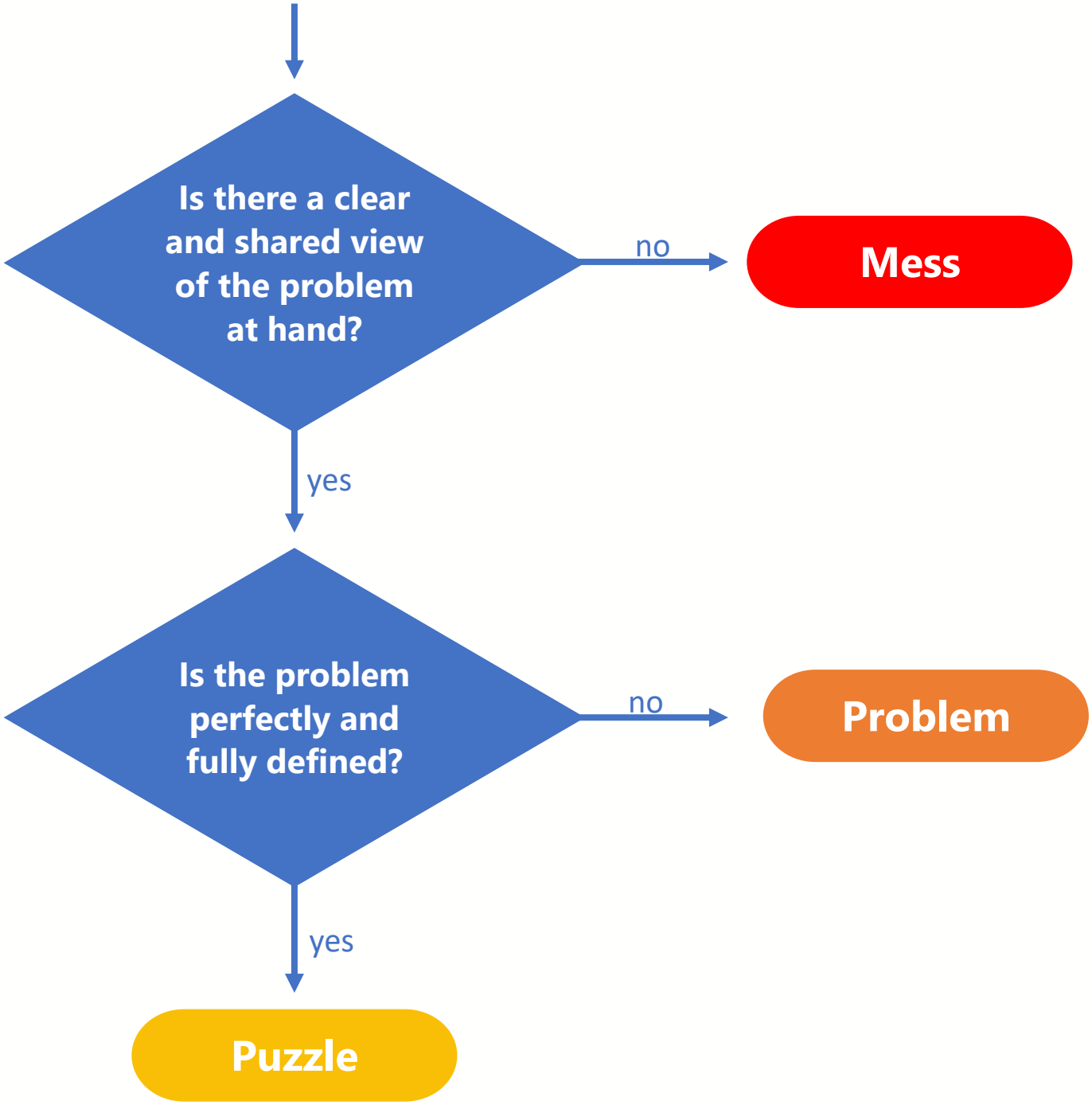
From what to how

How much is enough?

Signposting


opening
broadening
focusing
progressing

Puzzles, problems and messes



Adapted from

Redesigning the future,
Russell Ackoff, 1974

and

Tools for thinking,
Michael Pidd, 1996

Puzzle, problem or mess (1)

You bump into a director in the corridor. They are late for another meeting, but mention that a summit has been called with the leaders of the other local organisations (NHS and LA) to sort out the problems with the urgent care system. They ask whether you could pull some data and charts together that will be used to set the scene for the summit.

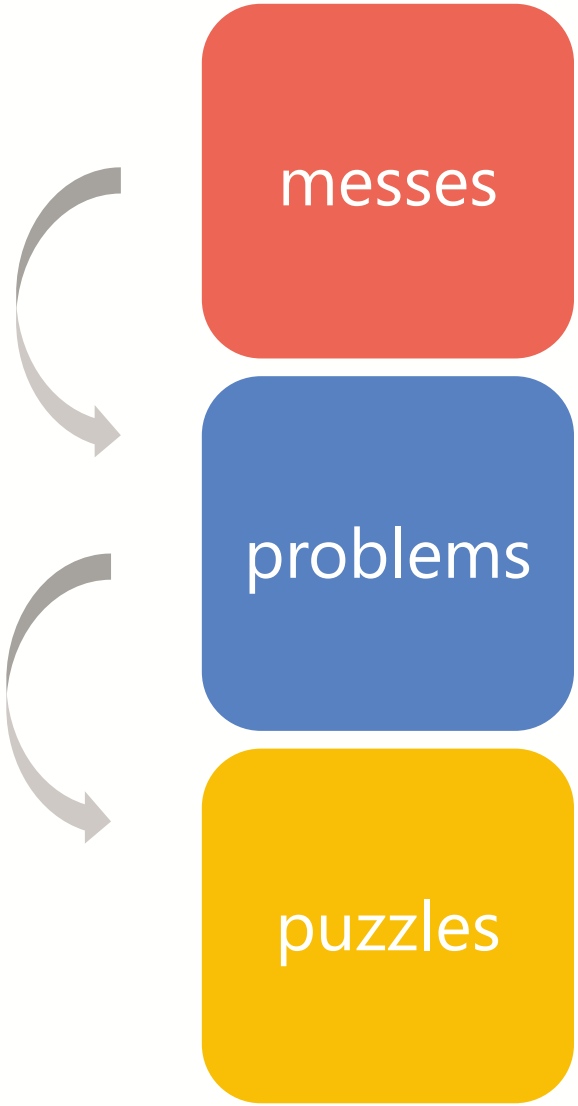
You receive an email containing the following information and question.

"A hospital has 10 consultants and 50 nurses who are each available to work 220 days per year and who are capable to working on procedures of two types, A and B.

A team of one consultant and two nurses can do 4 procedures As per day. A team of two consultants and 5 nurses can do 8 procedure Bs per day. For every 5 people that receives procedure A, 3 will need procedure B immediately afterwards. The hospital cannot transfer a patient who has received procedure A to another hospital to carry out procedure B. There is demand for 9,000 procedure As and 12,000 procedure Bs per annum. All consultants and nurses are capable of working on cases of types A and B, but can only work on procedures of one type on any given day.

The net income to the hospital is £200 for procedure A and £250 for procedures B. What level of procedures A and B should the hospital do in order to maximise its income?"

You receive a phone call from a service manager. You have not met this person before. They tell you that they are working with some colleagues to reduce delayed transfers of care from hospital. They need to know how many people received a home care package in the local and surrounding areas last year and wondered if you could provide this data.

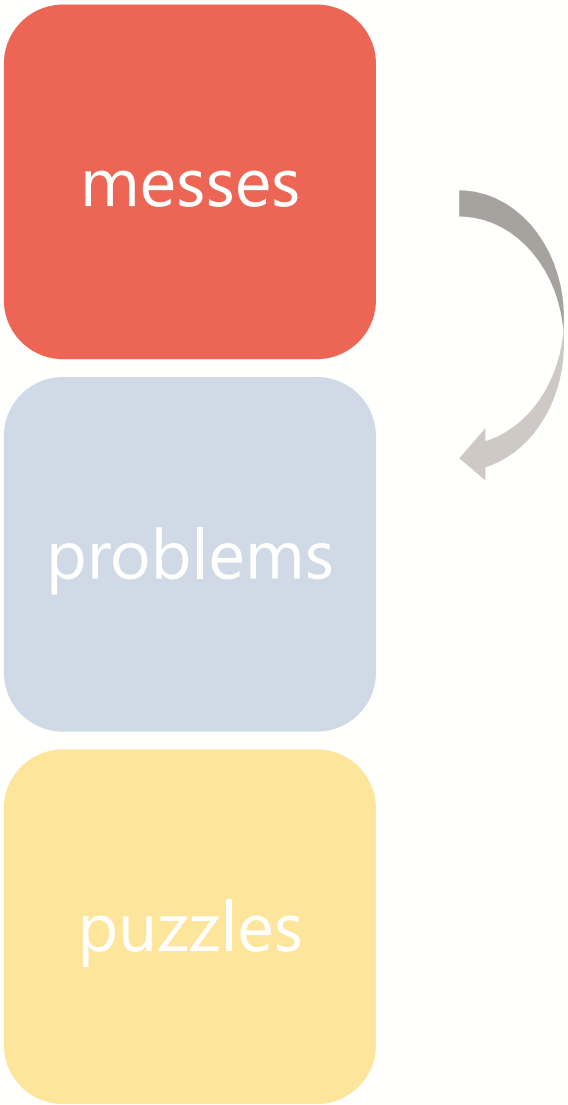


Hard analytical techniques can only be applied to puzzles.

So how can we turn messes and problems into puzzles?

Regard the Ackoff hierarchy as a diagnostic tool.

From a mess to a problem



(predominantly) a process of **clarifying, challenging** and **seeking agreement**

From a problem to a puzzle

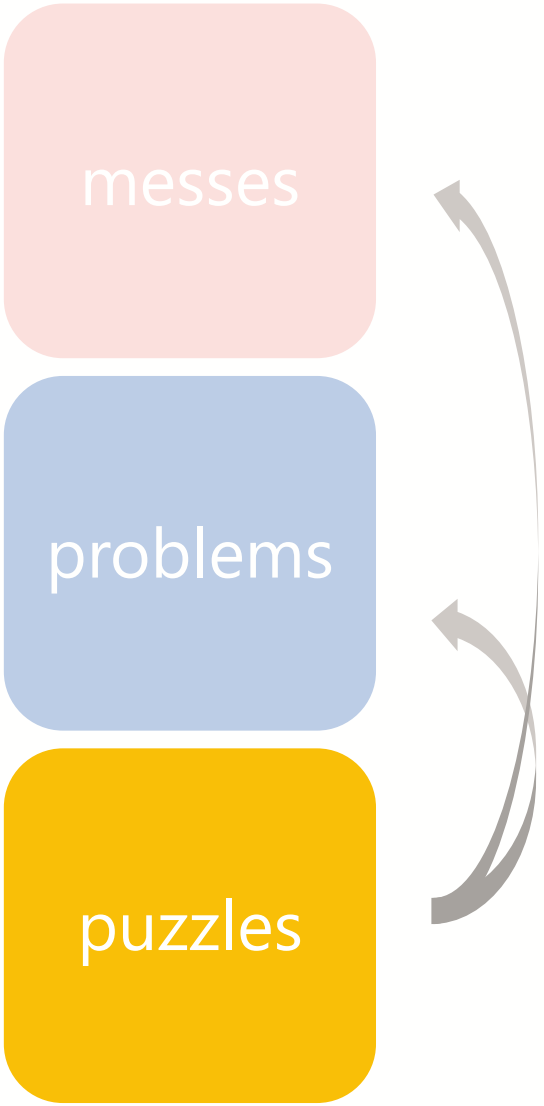
(predominantly) a process of **defining**;

(1) agreeing scope,

(2) establishing precision/thoroughness required and

(3) setting assumptions

When given a puzzle



Has this issue been explored adequately?

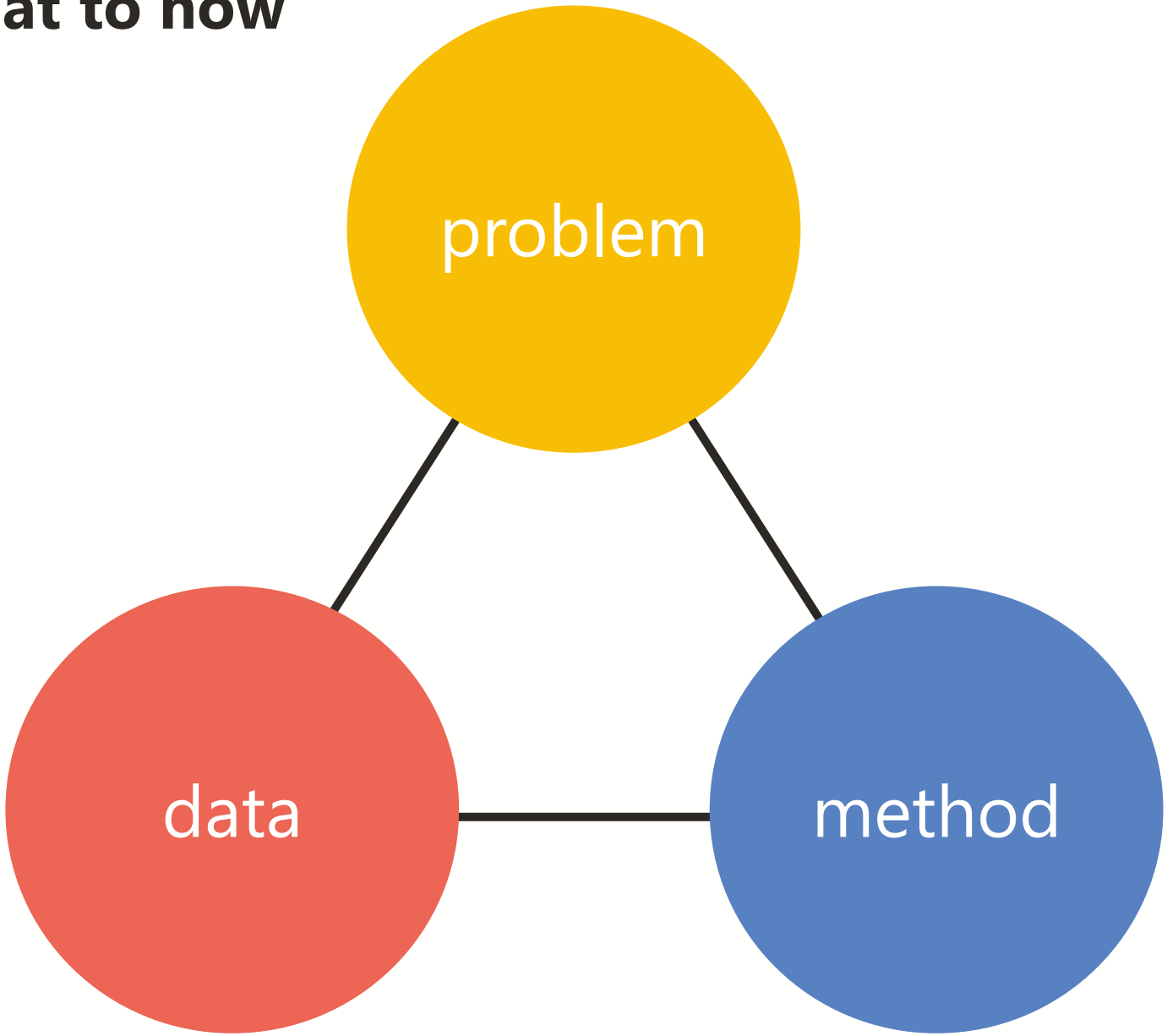
Should we probe the credibility and thoroughness of the underpinning logic?

A Warning

"One of the greatest mistakes that can be made when dealing with a mess is to carve off part of the mess, treat it as a problem and then solve it as a puzzle -- ignoring its links with other aspects of the mess."

Michael Pidd, Tools for Thinking

From what to how



From what to how – a typology of analytical projects

Five ‘types’ of analysis defined according to the nature and context of the problem to be addressed.

Some projects include multiple phases, and that different phases require different ‘types’ of analysis.

1 Descriptive Analytics

2 Explicative Analytics

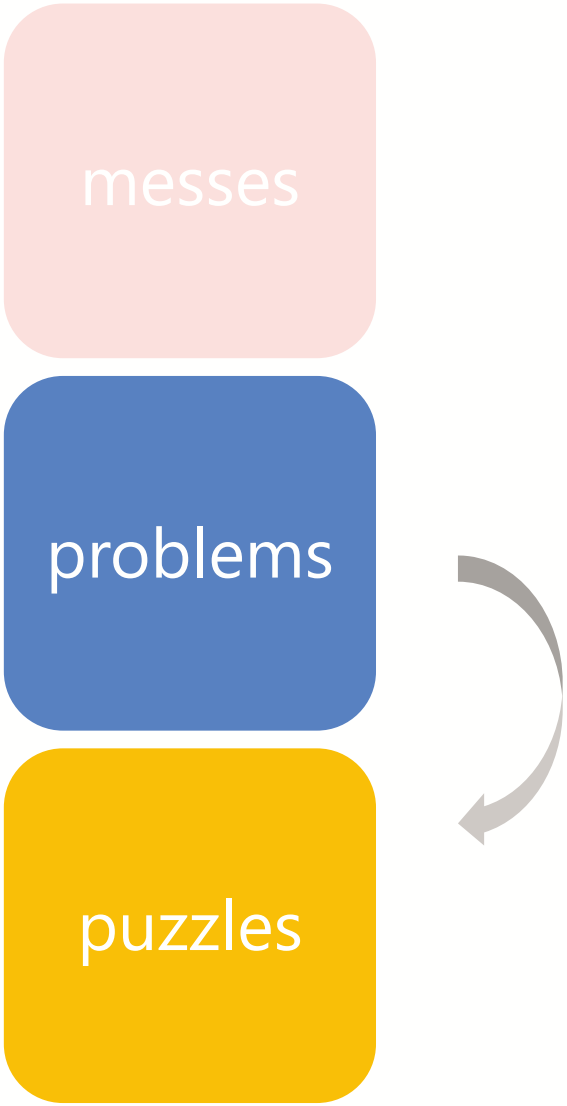
3 Predictive Analytics

4 Prescriptive Analytics

5 Evaluative Analytics

Descriptive Analytics- What is the world like now and in the past? Using multiple data sources to provide a coherent overview of activity, resource use, performance, quality, efficiency, experience and outcomes. *Commonly used methods: Summary statistics, data visualisation, geospatial mapping, metric development and derivation, prevalence studies, experience surveys.*	**Explicative Analytics -** Why is the world the way it is? Exploring and explaining observed patterns of activity, performance and outcomes and the variation in these between groups and over time. *Commonly used methods: Explanatory regression modelling, inferential statistics and hypothesis testing, data-mining, observational (risk) studies, choice experiments.*	**Predictive Analytics -** What might the future hold for patients, services and populations? Estimating how activity levels, performance and outcomes change in the future under different assumptions and scenarios. *Commonly used methods: Time series forecasting, risk prediction, machine learning, scenario planning, simulation, ex-ante modelling, epidemiological and demand modelling.*	**Prescriptive Analytics -** What should we do? Providing specific advice for decision makers in order to make best use of available resources to maximise health outcomes *Commonly used methods: Opportunity assessments, options appraisals, resource allocation, resource planning, scheduling, optimisation, statistical process control, decision aids and decision analysis.*	**Evaluative Analytics -** Did it make a difference and was it worth it? Estimating the impact and costs of changes that are or have been made to the health system to inform decisions about implementation and whether to continue / roll-out. *Commonly used methods: Causal inference, logic modelling, experimental and quasi-experimental studies, directed acyclic graphs, contribution, mediation and moderation analysis, cost effectiveness, cost benefit and return on investment analysis.*

How much is enough?



(predominantly) a process of **defining**;

(1) agreeing scope,

(2) establishing precision/thoroughness required and

(3) setting assumptions

Elements and principles of data analysis

Hicks S, Peng R, March 2019

1. Data matching — The data required to investigate the problem or hypothesis is readily available
2. Exhaustive — Multiple, complimentary methods used to address the problem
3. Sceptical — Multiple, alternative explanations sought to explain observed data
4. Second-order — Related or contextual issues also considered
5. Transparent — Uses annotation, narrative and visualisations to explain the methods and results
6. Reproducible — The analysis could be reproduced with confidence by another analyst

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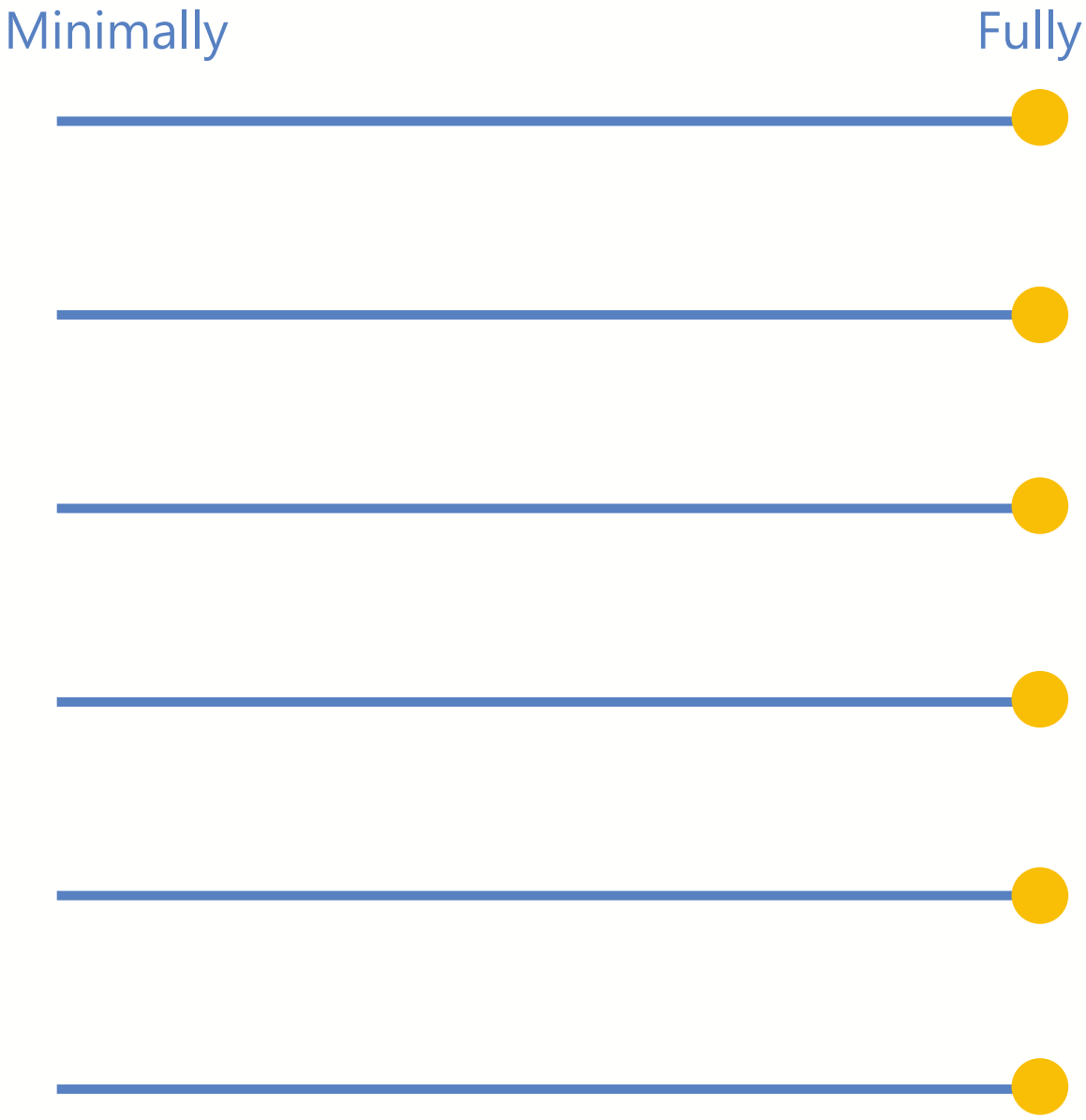

Elements and principles of data analysis

Hicks S, Peng R, March 2019

Formal Problem Structuring Methods

Soft Systems Methodology

Soft Systems Methodology (SSM) is also one of the most widely used Soft OA methods. It follows the logic that every problem is like a system that needs to be understood. Checkland felt that these systems (problems) could be better understood if compared to reality in a model which could structure a debate focused on the differences, and could later identify where changes need to be made.

Theory of Constraints

Theory of Constraints is one of the most recently developed Soft O.R. techniques. It aims to overcome the fact that any organisation has a constraint, or a number of constraints, that dominate the entire system and the secret to success lies with managing these constraints, and managing the system as it interacts with the constraints, to get the best out of the whole system. According to Goldratt, there are a number of key steps involved based on the fact that goal achievement is limited to at least one constraint.

Definitions taken from 'Soft Operational Research Techniques' – Seagriff & Lord

Strategic Options Development Analysis

SODA (Strategic Options Development Analysis) is one of the more popular Soft O.R. methods. It is essentially a way of making sense of a complex problem through the eyes of a client group. As a problem structuring method, SODA aims to channel the cooperation of a variety of stakeholders into addressing a problem.

Scenario Planning

Scenario planning is a method for learning about the future by understanding the nature and impact of the most uncertain and important driving forces affecting our future. With this method, you can use stories or scenarios to find out more about near, medium and long term futures. It is a group process that uses techniques in workshops and the transfer of knowledge to understand the nature and impact of those driving forces that will affect the organisation or a particular problem – which are most uncertain and have the most impact. With this method, it is important to gain a deeper understanding of the central issue important to the future.

The Strategy Unit.

Any questions?